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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/757,007	01/14/2004	Yuuta Nakaya	FUJI 20.846	3290

26304 7590 03/23/2007

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EXAMINER	
FOTAKIS, ARISTOCRATIS	
ART UNIT	PAPER NUMBER
2611	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/23/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/757,007	NAKAYA ET AL.	
	Examiner	Art Unit	
	Aristocratis Fotakis	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 January 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 - 33* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 - 33* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *14 January 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *01/14/2004, 11/07/2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1 – 12 and 32 – 33 are rejected under 35 U.S.C. 102(b) as being anticipated by Cheng et al., ("Adaptive Beamforming of ESPAR Antenna Based on Steepest Gradient Algorithm", IEICE TRANS. COMMUN., VOL.E84-B, NO.7 July 2001)

Re claims 1, 4, 32 and 33, Ohira teaches of a method of controlling an array antenna part (adaptive algorithm, Fig.4) having a plurality of antenna elements (M elements, Fig.1, Page 1791, Lines 2 – 7) arranged at a predetermined interval (radius of a circle R, Page 1791, Chapter 2, ESPAR Antenna Formulation, Lines 4 - 11), comprising: obtaining a predetermined evaluation function (cross-correlation coefficient, ρ, Page 1793, Chapter 4, Paragraph 3) with respect to each of weighting coefficients (equation 16, Page 1793) to be applied to incoming signals arriving at a predetermined number of antenna elements (M elements, Fig.1, Page 1791, Lines 2 – 7), by perturbing each of the weighting coefficients (Page 1794, Last Paragraph) at a sampling interval

which is within one symbol time (*one frame of a training sequence of frames*, Fig.3, last paragraph); and adjusting each of the weighting coefficients based on the evaluation function (equation 17, Page 1794, First paragraph, Fig.4).

Re claims 2 - 3 and 6 - 7, 9 – 10 Cheng teaches all the limitations of claim 1, as well as the antenna part comprising one active antenna element to transmit and receive a radio signal (0^{th} element, Fig.1, Page 1791, Chapter 2, Paragraph 1), and a plurality of passive antenna elements (M elements, Fig.1, Page 1791, Chapter 2, Paragraph 1) and variable reactances are loaded to the plurality of passive antenna elements (Fig.1, Page 1791, Chapter 2, Paragraph 1, Lines 8 – 18, equation 1), said method comprising: adjusting phases (Chapter 3, Fig.2) and amplitudes (Page 1793, Chapter 4, Lines 14 – 18) of incoming signals arriving at the plurality of antenna elements; converting an analog signal (discrete y(t) and r(t)) received by the active antenna element into a digital signal (y(n). r(n), samples) by sampling the analog signal at a predetermined period (Page 1793, Chapter 4, third paragraph, equation 15); and adjusting reactances of the variable reactances to (Page 1791, Chapter 2, Second paragraph, Lines 8 – 14) minimize or maximize the evaluation function (*change of the cross-correlation coefficient*), by defining as the evaluation function a correlation coefficient (Page 1794, Col 1, Lines 16 – 21) which is obtained from a correlation of the digital signal (*y(t)*, Fig.1) and a known signal (*r(t)*, Fig.1) having a predetermined pattern (Page 1793, Chapter 4, Col 1, First and third Paragraph).

Cheng does not specifically teach of oversampling when converting data from analogue to digital. However, it is well know in the art that oversampling is used in an A/D converter for achieving higher A/D resolution and SNR (*official notice is taken here*). Therefore it would have been obvious to oversample the data in the A/D converter.

Re claim 5, Cheng teaches of the control unit comparing the evaluation function ρ_n and a predetermined threshold value $\rho_n^{(0)}$, and adjusts each of the weighting coefficients $\partial\rho_n/\partial x_n$ depending on a compared result (Fig. 4, Page 1794, equation 18).

Re claim 8, Cheng teaches of a radio frequency processing part (calculation of correlation coefficient part) coupled to the plurality of antenna elements, and including said adjusting unit (determination of (x1...x6) part, Fig.1).

Re claims 11 - 12, Cheng teaches of the adjusting part of the control unit adjusting the reactances (determination of (x1...x6) part, Fig.1) of the variable reactances (phases and the amplitudes) to minimize or maximize the evaluation function (*change of the cross-correlation coefficient*) based on a gradient vector $\partial\rho_n/\partial x_n$ of the correlation function (Page 1794, Col 1, Lines 16 – 21).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 13 – 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cheng in view of Zhang (US 6,369,758).

Re claims 13 – 17, Cheng teaches all the limitations of claims 4, 6 - 7 except of the use of a base converter for converting a time-based digital signal into frequency domain and where the receiving apparatus is intended for a multicarrier system.

Zhang teaches of an adaptive antenna array for mobile communications where pseudo random training symbols and/or a constant modulus pilot carrier in OFDM symbols are used to train the adaptive antenna array to cancel unwanted multipath signals and suppress interfering signals (Abstract, Fig.1). The array antenna control apparatus comprises of a base converter (DFT, Fig.6) to convert a time-based digital signal which is described in a time-domain and output from said analog-to-digital converter (#16, Fig.1) into a frequency-based digital signal which is described in a frequency-domain (Col 14, Lines 48 – 65), said adjusting part (#22, Fig.1) of the control unit defining as the evaluation function a correlation coefficient (cost function, Col 5, equations 1 – 3) which is obtained from a correlation of the frequency-based digital signal and a frequency-based known signal (pilot carrier).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have used a DFT in order to demodulate the pilot subcarrier, thus eliminating the need for a full FFT to be done on each antenna output.

Re claims 18 – 19, Cheng teaches of the known signal (r(t), Fig.1) for transmitting control information within a frame (Page 1794, Chapter 4, Last paragraph, Fig.3) employed by a predetermined system or protocol (algorithm, Fig.4).

Re claims 20 – 31, Cheng and Zhang teach all the limitations of 6 – 7 and 14 – 15. Cheng does not teach of the profile-obtaining unit.

Zhang teaches of a profile-obtaining unit to obtain a delay profile statistically describing instantaneous characteristics of a transmission path (Col 4, Lines 60 – 67, Fig.1). It should be noted that multipath reflections (delayed signal) arriving in the receiver require a channel impulse response measurement in the profile-obtaining unit in order to obtain the delay spread in the power delay profile. The transfer function of the multipath channel is the frequency representation of the impulse response.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have used a profile-obtaining unit to obtain a delay profile of the multipath channel to suppress the unwanted multipath signals so as to steer towards the desired dominant signal path.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Aristocratis Fotakis whose telephone number is (571) 270-1206. The examiner can normally be reached on Monday - Thursday 7 - 5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh Fan can be reached on (571) 272-3042. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

AF

CHIEH M. FAN
SUPERVISORY PATENT EXAMINER